510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
DEVICE ONLY TEMPLATE

A. 510(k) Number:
k031601

B. Analyte:
Cephalothin at 0.5-32 ug/ml AST

C. Type of Test:
Quantitative <16 hour and ≥ 16 hour results; growth based

D. Applicant:
Dade Behring Inc.

E. Proprietary and Established Names:
MicroScan® rapID/S *plus*™ Gram-Negative MIC/Combo Panels

F. Regulatory Information:

1. Regulation section:
   866.1645 Short-Term Antimicrobial Susceptibility Test System
   866.1640 Antimicrobial Susceptibility Test Powder
2. Classification:
   II
3. Product Code:
   LON –Automated AST System – short incubation
   LRG-Instrument for Auto Reader & Interpretation of Overnight Antimicrobial Susceptibility Systems
   JWY - Manual Antimicrobial Susceptibility Test Systems
   LTT – Panels, Test, Susceptibility, Antimicrobial
   LTW – Susceptibility Test Cards, Antimicrobial
4. Panel:
   83

G. Intended Use:

1. Intended use(s):
   For use with MicroScan rapID/S *plus*™ panels read on the WalkAway® -SI System or equivalent (upgraded WalkAway® -40 or WalkAway® -96). MicroScan® panels are designed for use in determining quantitative and/or qualitative antimicrobial agent susceptibility and/or identification to the species level of colonies, grown on solid media, of rapidly growing aerobic and facultative anaerobic gram-negative bacilli. (Enterobacteriaceae, glucose non-fermenters, and non-Enterobacteriaceae glucose fermenters).
2. Indication(s) for use:
   For testing Enterobacteriaceae such as *Klebsiella pneumonia, Escherichia coli, Proteus mirabilis*, and certain *Citrobacter spp*. with cephalothin at concentrations between 0.5-32 ug/mL.
3. Special condition for use statement(s):
   - Results for *Klebsiella oxytoca* have been excluded from the MicroScan rapID/S *plus*™ panels and overnight data base therefore no results will

be reported for cephalothin. An alternate method should be performed when this combination is identified.

- Due to expected natural resistance to cephalothin, MIC and interpretative results with *Enterobacter spp, Citrobacter freundii, Morganella morganii, Proteus vulgaris, Proteus penneri, Providencia spp., Serratia spp.* or *Yersinia enterolitica* will not be reported in the Customer Software or on patient reports.
- The method of inoculation is only the Turbidity method, the Prompt® system should not be used with this system.
- Prescription Use

4. Special instrument Requirements:
   Not Applicable

H. Device Description:

The MicroScan® rapID/S plus™ Panel contains microdilutions of each antimicrobic in various concentrations on dehydrated and dried panels with Mueller Hinton Broth and various nutrients. Each panel contains two control wells: a no-growth control well (contains water only/no nutrients or broth), and a growth control well (contains test medium without antibiotic). The panel is rehydrated and inoculated at the same time with 0.1 ml of suspension prepared by the turbidity method (inoculum prepared in water, then 0.1ml transferred to 25ml of inoculum water containing pluronic-D/F-a wetting solution).

I. Substantial Equivalence Information:

1. Predicate device name(s):
   MicroScan® rapID/*S plus*™ Gram Negative MIC/Combo Panels
   MicroScan® Dried Gram-Negative MIC/Combo Panels
2. Predicate K number(s):
   K020185
   K862140
3. Comparison with predicate:

Similarities		
Item	**Device**	**Predicate**
Intended use	AST testing of gram negative organisms	Same for both predicates
Technology	Growth based	Growth based
Panel format	Dried antibiotics	Dried antibiotics
Results	Report results as minimum inhibitory concentration (MIC) and categorical interpretation (SIR)	same
Differences		
Item	**Device**	**Predicate**
Inoculum preparation	Inoculum prepared from isolated colonies using the Turbidity method only.	Inoculum prepared from isolated colonies using either the Turbidity method or Prompt® system

Mixing step	Antibiotics are mixed by air pressure in incubation instrument	No mixing
Instrument	WalkAway® -SI System or equivalent (upgraded WalkAway® -40 or WalkAway® -96).	autoScan® -4 or WalkAway®
Reading algorithm	Continuous monitoring of growth for resistance with comparison to previous readings	Monitors for growth without comparing to subsequent readings
Incubation time	Readings performed at <16 hour if growth is sufficient and if not then panels are incubated up to 18 hours until reading is possible.	MicroScan® Dried Gram-Negative panels can only be read after 16 hours of growth.
Antibiotic	Cephalothin at 0.5-32 ug/mL	Different concentrations depending on the antibiotic
Test organism	*Klebsiella pneumonia, Escherichia coli, Proteus mirabilis,* and certain *Citrobacter spp.* but not *K. oxytoca*	Varies according to the antibiotic

J. Standard/Guidance Document Referenced (if applicable):

"Class II Special Controls Guidance Document: Antimicrobial Susceptibility Test (AST) Systems; Guidance for Industry and FDA" ; NCCLS M7 (M100-S14) "Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria That Grow Aerobically; Approved Standard".

K. Test Principle:

The WalkAway® SI uses a Colorimetric Optics System consisting of a color wheel/lamp assembly and a Photosensor. Panels that are to be read with the new earlier reading times are mixed when initially placed in the instrument. There is an initial read at 2.5 hours with a possible final read at 4.5, 5.5, 6.5, 8, 10, 12, 16, or 18 hours depending on the growth rate of the organism being tested. The initial read is subtracted form the final read to minimize variations from all components of the system. The time of final read is dependent on the growth rate of the organism and the sensitivity of the automatic reader since cell densities below 2 x 10^7 cells/ml are not detected. Reading considerations are built into the reading for faster growing and slower growing organisms. Organisms that do not reach a specific threshold at 4.5 hours have the minimum threshold raised at 5.5 hours. This allows for fermenters (faster grower organisms) to be read at 4.5, 5.5 or 6.5 hours and delay the reading of non-fermenters (slow growing) to 8, 10, 12 and up to 18 hours.

L. Performance Characteristics (if/when applicable):

1. Analytical performance:
    a. *Precision/Reproducibility:*

Reproducibility was demonstrated using 25 isolates tested at 3 sites one time. All 25 isolates had a mode that was on scale. The study included the testing of the following reading variables; turbidity inoculum method of inoculation with reading on the WalkAway® instrument at <16 hours to 18 hours on the WalkAway® instrument, 16-18 hours on unmixed plates read on the WalkAway® instrument, and manual/visual readings at 16-18 hours for both mixed and unmixed plates. An additional reproducibility study was conducted on organisms that grew in <16 hour. All demonstrated >95% reproducibility.

b. Linearity/assay reportable range:
Not applicable

c. Traceability (controls, calibrators, or method):

Quality Control was performed daily with the turbidity method and with the different incubation times, instruments and mixed or unmixed panels, with the following results.

ORGANISM	**RESULTS**							
	ug/mL		Mixed			Unmixed		
		Reference	Manual	<16 h Walk-Away ®	Walk-Away® ≥ 16 h	Reference	Manual	Walk-Away® ≥ 16 h
E. coli ATCC 25922 Expected range 4-16 ug/mL	1							
	2							
	4							
	8	81	57		50	44	33	31
	16	27	54		58	10	21	23
	32		1	2	4			
	>32	1				1	1	1

Quality control results demonstrated the ability of all variables of the procedure to produce acceptable results. Only 2% of the readings were available in <16 hours of incubation.

Inoculum density control: A turbidity meter was used for the turbidity inoculation method. Colony counts were also performed using the turbidity method when inoculating both the dried MicroScan® panels and the frozen reference panels. The turbidity method of inoculation for the reference test had average inoculums that were in the acceptable range.

d. Detection limit:
Not applicable

e. Analytical specificity:
Not applicable

f. Assay cut-off:

Not applicable

2. Comparison studies:

a. Method comparison with predicate device:

Clinical testing was performed at three sites using fresh isolates supplemented with stock isolates of *Enterobacteriaceae*. A comparison of the MicroScan® rapID/S *plus*™ Gram-Negative test panel results was made to the reference method conducted as recommended in the NCCLS standard M7-A6. Testing of the reference method and the MicroScan® rapID/S *plus*™ Gram-Negative panels was performed at the same time. A challenge set was also tested at one site and compared to the reference broth dilution result mode that was determined by previous testing of each isolate multiple times in the recommended reference panel.

Sixty eight % (301/444) of the clinical isolates and 43% of the challenge isolates were available for <16 hour results. The rest required ≥ 16 hours of incubation for a final result.

Performance on all methods is presented below:

	total	**EA**	**%EA**	**Total evaluable**	**EA of evaluable**	**%EA**	**CA**	**%CA**	**#R**	**min**	**maj**	**vmj**
MicroScan® rapID/S *plus*™ WalkAway® Results												
Clinical	444	435	98	276	267	96.7	421	94.8	191	23	0	0
Challenge	75	69	92	68	64	94.1	60	80	11	13	1	1
Total	519	504	97.1	344	331	96.2	481	92.7	202	36	1	1
Overnight Instrument results												
Clinical	444	438	98.6	274	268	97.8	419	94.4	191	24	1	0
Challenge	75	72	96	68	67	98.5	60	80	11	13	1	1
Total	519	510	98.3	342	335	98	479	92.3	202	37	2	1
Manual Readings												
Clinical	444	437	98.4	274	267	97.4	419	94.4	191	24	1	0
Challenge	75	73	97.3	68	68	100	62	82.7	11	12	0	1
Total	519	510	98.3	342	335	98	481	92.7	202	36	1	1

EA-Essential Agreement
CA-Category Agreement
R-resistant isolates
maj-major discrepancies
vmj-very major discrepancies
min- minor discrepancies

Evaluable results are those that fall within the test range of the reference method and could also be on-scale with the new device if within the plus/minus one well variability. EA is when there is agreement between the reference method and the MicroScan® rapID/S *plus*™Gram-Negative Panels within plus or minus one serial two-fold dilution of antibiotic. CA is when the interpretation of the reference method agrees exactly with the interpretation of the MicroScan® result.

b. Matrix comparison:

Not applicable

3. Clinical studies:

   a. *Clinical sensitivity:*
      Not applicable
   b. *Clinical specificity:*
      Not applicable
   c. *Other clinical supportive data (when a and b are not applicable):*
      Not applicable

4. Clinical cut-off:
   Not applicable
5. Expected values/Reference range:
   ≤ 8 (S), 16 (I), ≥ 32 (R)
   Interpretative criteria and Quality Control ranges are the same as recommended by the FDA and the NCCLS Standard M100 and will appear in the package insert.

M. Conclusion:

The submitted information in this premarket notification is complete and supports a substantial equivalence decision.